

REMARKS**Summary of the Office Action**

Claims 1-5, 9-26, 28-36 and 38 are rejected under 35 U.S.C. § 103(a) as being unpatentable over International Patent Application Publication No. WO 02/22301 to Fukuyo et al. (“Fukuyo”) in view of Japanese Patent Publication No. 2003-154517 to Yoshimura et al. (“Yoshimura”) and the article entitled “Formation of Photo-induced Structures in Glasses with Femtosecond Laser” by Miura et al. (“Miura”).

Claims 6, 27 and 37 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fukuyo in view of Yoshimura, and Miura, and further in view of the article entitled “Stealth Dicing, its Principles and Features: a Technology Most Suitable for Dicing Very Thin Semiconductor Wafer” by Hidetsugu (“Hidetsugu”).

Summary of the Response to the Office Action

Applicant has amended claims 1-3, 5-6, 10-14, 16-22, 24, 27-29, 31 and 33-38.

Applicant has canceled claims 4, 7, 15, 23, 25, 26, 30 and 32 without prejudice or disclaimer.

Applicant has added new claims 39-47.

Claims 1-3, 5-6, 9-14, 16-22, 24, 27-29, 31, 33-38 and 39-47 are pending.

All Claims Define Allowable Subject Matter

Applicant respectfully traverses the rejections under 35 U.S.C. § 103(a). Applicant has amended independent claims 1, 3, 12-14, 19-22, 24, 29, 31 and 33-38 to provide a different recitation relating to Applicant's invention.

Claim 1 recites "the treated area is a molten processed area", "the laser light is a pulsed laser light", "a pair comprising the treated area and the minute cavity is formed by irradiating at least 1 pulse of the laser light, the laser light being relatively moved along the planned cutting line, thereby forming a plurality of pairs along the planned cutting line" and "each of the minute cavities are separated by a predetermined distance along the planned cutting line." Support for claim 1 is provided at, for example, paragraphs 0006 and 0056, Figures 5 and 9-11, and original claims 4-7, 15, 23, 25, 26, 30 and 32, of Applicant's specification.

Fukuyo discloses that a molten processed area is formed in an object to be processed as a modified area, which is supposed to be a starting point for cutting. Yoshimura discloses forming a void, which is a minute cavity without a micro crack, in an object to be processed. However, even though the void without the micro crack is formed in the object to be processed; i.e. the void is formed by itself, it is impossible to precisely cut the object to be processed along the planned cutting line.

In contrast, in an embodiment Applicant's invention is characterized in that a pair of the treated area and the minute cavity is formed by irradiating at least 1 pulse of the laser light, while the laser light is relatively moved along the planned cutting line, thereby forming a plurality of pairs along the planned cutting line. This characteristic enables precise cutting along the planned cutting line in an object to be processed, as compared with Fukuyo in which the molten processed area is formed by itself and Yoshimura in which the void is formed by itself.

Regardless of the above described respective disclosures of Fukuyo and Yoshimura, Applicant respectfully submits that even if it was somehow obvious to one of ordinary skill in the art to combine Fukuyo and Yoshimura (a notion with which Applicant respectfully disagrees), the combination still would not disclose that at least 1 pulse of the laser light forms a pair comprising the treated area and the minute cavity. In this regard, Miura is directed to forming a refractive index change region in an object to be processed for forming an optical waveguide, not for cutting.

Also, Applicant notes that Yoshimura discloses forming a void only, without a micro crack being formed. In this regard, Yoshimura rejects illustrative embodiments of Applicant's invention. For this reason as well, Applicant respectfully submits that it would not be obvious to one of ordinary skill in the art to combine Yoshimura with Fukuyo.

Applicant respectfully submits that Fukuyo, Yoshimura and Miura do not disclose at least the features of "the treated area is a molten processed area", "the laser light is a pulsed laser light", "a pair comprising the treated area and the minute cavity is formed by irradiating at least 1 pulse of the laser light, the laser light being relatively moved along the planned cutting line, thereby forming a plurality of pairs along the planned cutting line" and "each of the minute cavities are separated by a predetermined distance along the planned cutting line," as recited in claim 1.

Claims 2, 5, 6 and 9-11 depend from claim 1 and recite the same combination of allowable features recited in claim 1 as well as additional features that define over the applied art. For example, claim 6 recites "a pulse pitch is set to 1.00 μm to 7.00 μm ." The pulse pitch is the distance between each focus point (e.g. "P" in Applicant's Fig. 5.) Applicant respectfully submits that Hidetsugu fails to overcome the deficiencies of Fukuyo, Yoshimura and Miura.

Hidetsugu merely indicates that the distance between chips next to each other (i.e. the distance of dicing street) is 1 μ m. Accordingly, Applicant respectfully requests that the rejection under 35 U.S.C. § 103(a), of claims 1, 2, 5, 6 and 9-11, be withdrawn.

Claims 3, 12-14, 19-22, 24, 29, 31 and 33-38 have also been amended to include similar features as discussed above with regard to claim 1. Accordingly, similar arguments as discussed above with regard to claim 1 also apply to claims 3, 12-14, 19-22, 24, 29, 31 and 33-38.

Accordingly, Applicant respectfully requests that the rejection under 35 U.S.C. § 103(a), of claims 3, 12-14, 19-22, 24, 29, 31 and 33-38, and the claims dependent therefrom, be withdrawn and the claims allowed.

Applicant has added new claims 39-47. Support for new claims 39-47 is provided at, for example, paragraph 0059 of Applicant's specification. Examination of new claims 39-47 is respectfully requested.

CONCLUSION

In view of the foregoing, Applicant submits that the pending claims are in condition for allowance, and respectfully request reconsideration and timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicant's undersigned representative to expedite prosecution. A favorable action is awaited.

EXCEPT for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. § 1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account No. 50-0573. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. § 1.136(a)(3).

Respectfully submitted,

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